

LECTOTYPE DESIGNATION FOR *LOCUSTACARUS TRACHEALIS*
EWING AND A NEW SPECIES OF *LOCUSTACARUS*
(ACARINA: PODAPOLIPIDAE) FROM NEW ZEALAND

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ABSTRACT—A lectotype is designated for *Locustacarus trachealis* Ewing (Acarina: Podapolipidae). A new species, *Locustacarus masoni*, from New Zealand is illustrated and compared to the lectotype.

In a review of the genus *Locustacarus* by Husband and Sinha (1970), it was pointed out that a holotype of *Locustacarus trachealis* Ewing 1924 was not designated. A need for the designation of lectotypes has arisen with the discovery of a closely related, undescribed species from New Zealand. Lectotypes of *L. trachealis* are described here. The species from New Zealand is described and compared with the designated lectotypes of *Locustacarus trachealis*.

Lectotype Designation for *Locustacarus trachealis*: Eight syntypes from a single slide, U.S.N.M. 23773, were remounted on separate slides. A male specimen is designated lectotype and the remaining specimens as listed in Husband and Sinha (1970) are designated paralectotypes. Table 1 gives ranges and measurements of the male, adult female, larviform female and egg.

Male: Idiosoma of lectotype 150 μ long, 129 μ wide. Spine on tibia I 8 μ long, curved. Posterior solenidion on tibia I 11 μ in length, slightly thicker than distal solenidia. Aedeagus long, slender, pointed apically, slightly enlarged subapically, extends over the gnathosoma.

Larviform female. Palpal setae 7.0 μ long; ventral gnathosomal setae more than $\frac{1}{2}$ length of gnathosoma.

Adult female. Idiosoma smooth, oval. One pair of legs.

Egg. Oval, smooth.

Type locality. Riley county, Kansas; collected between August 13, 1914 and August 15, 1915 in the trachea of *Hippiscus apiculatus* (Harris) and *Arphia carinata* Scudder (Acrididae), by C. C. Hamilton, L. P. Wehrle, and P. S. Welch.

The type slide, U.S.N.M. No. 23773, now contains the single male lectotype. The remaining male, larviform female, adult female and egg syntypes are now on separate slides bearing the same data as slide No. 23773 and are designated as paralectotypes.

Locustacarus masoni Husband, new species

Male. (Fig. 1, 2). Table 1 gives measurements of the male, adult female, larviform female and egg.

Gnathosoma: Longer than wide; dorsal and ventral gnathosomal setae less

Table 1.—Measurements (in μ) of *Locustacarus trachealis* and *L. masoni*.

Character	<i>L. trachealis</i>		<i>L. masoni</i>	
	Range	Mean	Range	Mean
	Adult Female			
	(N = 5)		(N = 10)	
Idiosoma length	458.0–582.0	533.0	265.0–519.0	373.4
Idiosoma width	394.0–542.0	473.0	224.0–435.0	321.7
Gnathosoma length	58.2–58.2	58.2	63.0–72.0	68.6
Gnathosoma width	43.8–52.0	47.9	50.0–62.0	54.9
Chelicera length ^a	21.3–30.6	24.7	25.0–30.0	26.9
Leg length ^b	—		37.0–51.0	46.9
	Male			
	(N = 2)		(N = 10)	
Idiosoma length	150.0–156.0	153.0	108.0–135.0	125.5
Idiosoma width	122.5–129.0	125.8	103.0–128.0	112.4
Gnathosoma length	27.5–30.6	29.1	25.0–30.0	27.9
Gnathosoma width	24.5–30.6	27.6	23.0–28.0	24.5
Chelicera length ^a	10.6–12.0	11.3	10.0–12.0	11.6
Aedeagus length	88.0–92.0	90.0	60.0–72.0	68.2
Aedeagus width	6.7–6.7	6.7	7.0–9.0	8.3
Length of s. v. i.	—	31.3 ^c	40.0–52.0	46.9
Length of s. v. e.	—	50.0 ^c	44.0–79.0	57.2
Length of s. sc. i.	—	46.5 ^c	40.0–64.0	54.6
Length of s. sc. e.	—	73.3 ^c	77.0–98.0	89.7
Length of s. h. e.	—	—	50.0–75.0	64.1
	Larviform Female			
	(N = 10)		(N = 10)	
Idiosoma length	156.0–199.0	170.8	118.0–128.0	122.5
Idiosoma width	113.0–138.0	126.0	96.0–108.0	101.2
Gnathosoma length	33.7–36.7	35.7	30.0–33.0	31.8
Gnathosoma width	38.3–39.8	39.6	31.0–33.0	32.0
Chelicera length	9.2–18.3	13.8	19.0–25.0	22.2
Opisthosomal seta length		174.2 ^c	166.0–202.0	193.0
Length of s. v. i.	—	30.0 ^c	25.0–34.0	28.7
Length of s. v. e.	—	41.5 ^c	30.0–44.0	38.3
Length of s. sc. e.	—	77.0 ^c	62.0–83.0	73.1
Length of s. h. e.	—	62.0 ^c	47.0–63.0	54.6
	Egg			
	(N = 10)		(N = 10)	
Length		163.9 ^d	161.0–181.0	172.9
Width		119.0 ^d	129.0–145.0	136.5

^a From point of bifurcation of base of chelicera.^b From the center of mesal margin of coxa to apex of pulvillus.^c Based on a single specimen, mean values represent the average of left and right setae.^d Values given by Wehrle and Welch (1925).

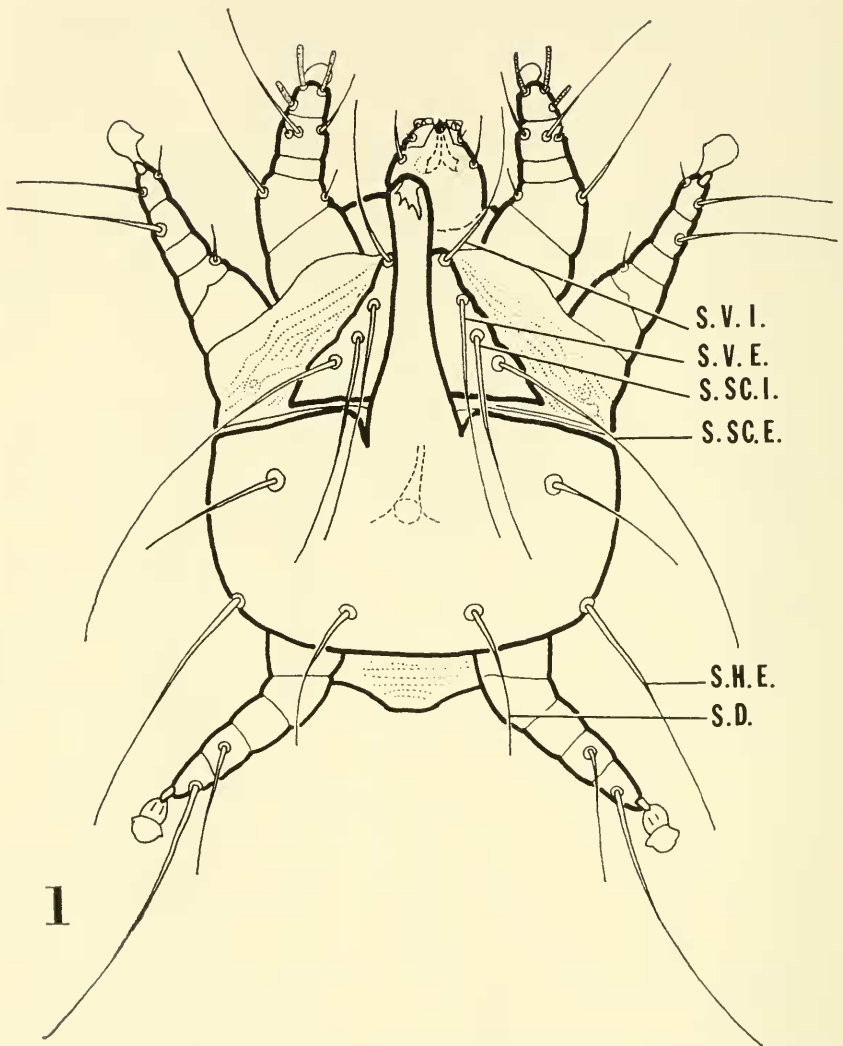


Fig. 1. *Locustacarus masoni*. Dorsum of male. Setae: S. V. I., verticles internae; S.V.E., verticales externae; S. SC. I., scapulares internae; S. SC. E., scapulares externae; S. H. E., humerales externae; S.D., dorsales.

than $\frac{1}{2}$ width of gnathosoma, pedipalps flattened distally. Chelicerae smooth, about $\frac{1}{2}$ as long as chelicerae of larviform females.

Propodosoma: Nearly triangular, 4 pairs of long setae, mean lengths given in Table 1.

Metapodosoma: Metapodosomal plate 2 completely fused to plate 1; setae

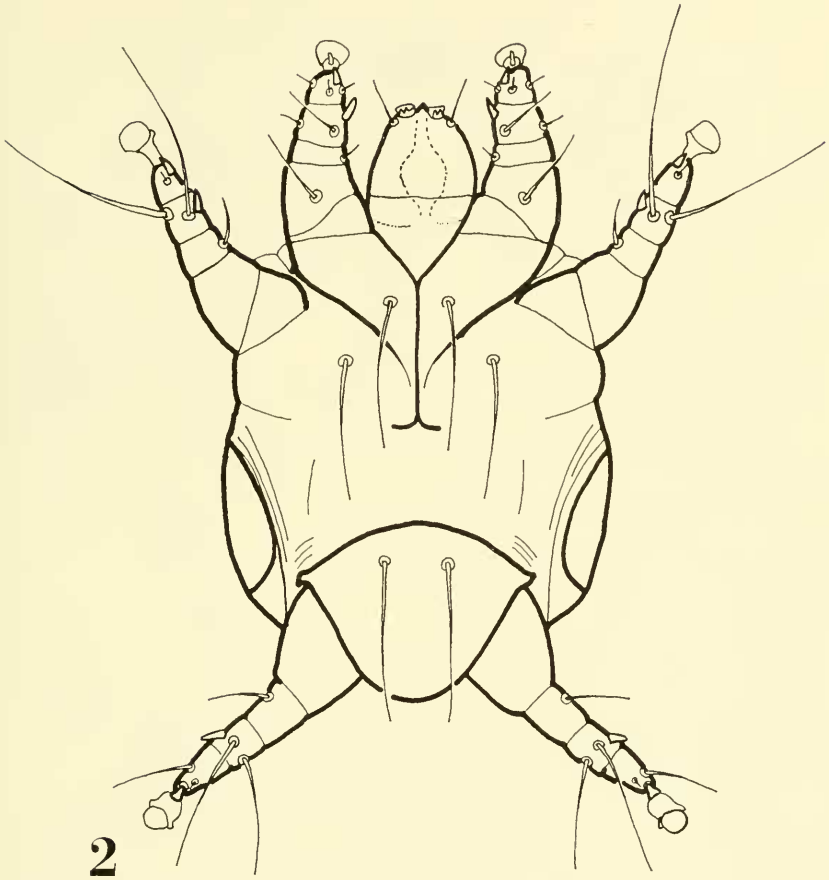


Fig. 2. *Locustacarus masoni*. Venter of male.

humerales internae and setae dorsales sub equal, about $\frac{1}{2}$ length of setae humerales externae; aedeagus emerging from anterior margin and extending free over the propodosoma. Aedeagus long, slender, rounded and slightly enlarged apically.

Opisthosoma: No plates or setae.

Sternum: Coxal plates I and II separated from plate III by an area of non-sclerotized integument.

Legs: Length of legs I and III, measured from center of mesal margin of coxa to distal margin of pulvillus, about $\frac{3}{4}$ length of idiosoma; legs II about $\frac{4}{5}$ length of idiosoma. Tibia I spine 4μ long, not curved; posterior solenidion on tibia I with mean length of 7.6μ , about the same diameter as distal solenidia. Single claw on leg I; 7 setae, including spines on tarsus I, 6 setae on tibia I.

Female. Similar to *Locustacarus trachealis*.

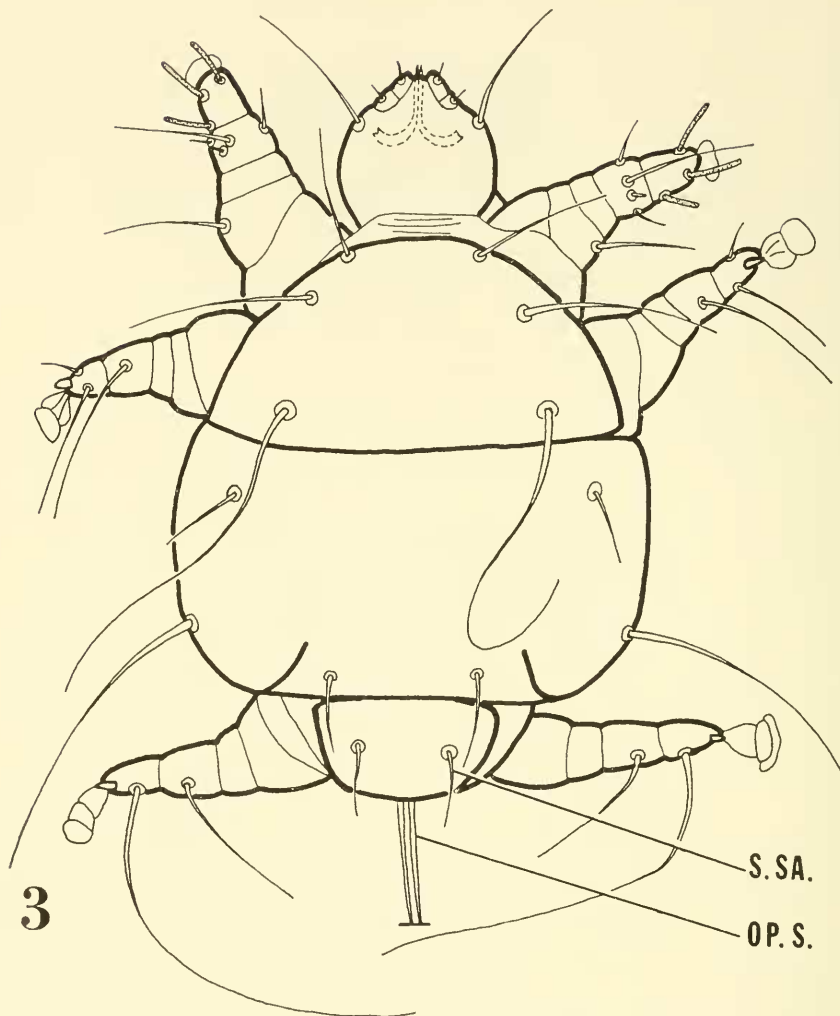


Fig. 3. *Locustacarus masoni*. Dorsum of larviform female. Setae: S. SA., sacrales; OP. S., opisthosomal.

Gnathosoma: Longer than wide, smooth, lightly sclerotized. Chelicerae smooth, bifurcated at proximal margins. Pedipalps not apparent. Stigmata at anterolateral margins of gnathosoma, round, lightly sclerotized, inconspicuous.

Idiosoma: Adult females 3 to 4 times the length of larviform females, nearly spherical to oval, (with 0-11 eggs), smooth surface, with part or all of the exoskeleton of the larviform female usually remaining attached to surface.

Legs: One pair of legs, tarsus with single stout spine; leg II represented by coxal plate only.

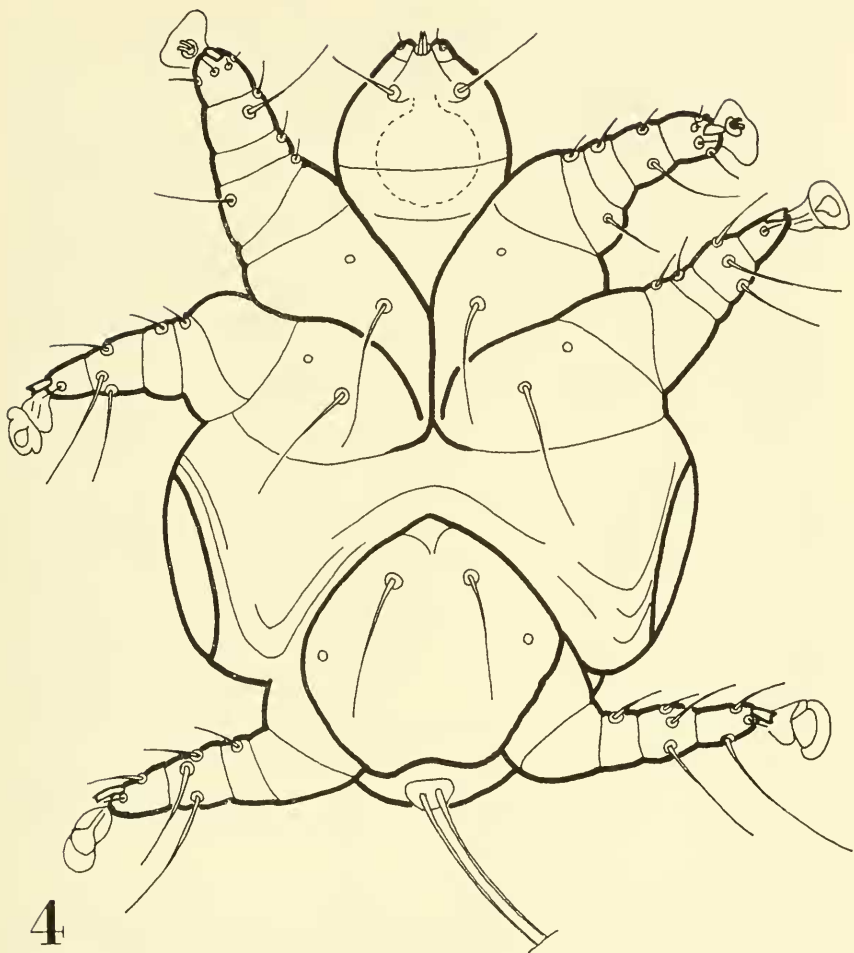


Fig. 4. *Locustacarus masoni*. Venter of larviform female.

Larviform Female. (fig. 3, 4)

Gnathosoma: Nearly as long as wide. Ventral gnathosomal setae less than $\frac{1}{2}$ the width of the gnathosoma; dorsal gnathosomal setae about equal to width of gnathosoma, pedipalps reduced, pedipalpal setae 3μ long; chelicerae smooth, moderately developed.

Propodosoma: Hemicircular, 3 pairs of long setae.

Metapodosoma: Anterior margin of plate 2 fused to posterior margin of plate 1. Setae humerales internae and setae dorsales long, nearly equal; setae humerales externae nearly 3 times length of setae humerales internae.

Opisthosoma: Plate I broader than long, setae sacrales about $\frac{1}{2}$ width of

plate; plate II small, with 2 opisthosomal setae which are distinctly longer than idiosoma.

Sternum: Coxal plates I and II separated from plate III by non-sclerotized integument; plate III fused, setae about $\frac{1}{2}$ length of plate.

Legs: Similar to legs of male in number of setae. No tibial setae modified as spines; leg I with 2 claws, dorsal setae on femur I and tibia I shorter than in the male, tarsus I with single ventral spine; tarsi II and III with 2 terminal spines.

Egg. Oval, length of egg of *L. masoni* intermediate between length of eggs of *L. trachealis* and *L. buchneri*. Width of egg of *L. masoni* larger than *L. buchneri*.

Holotype: ♂, Porter Heights, Canterbury, New Zealand, April 1970; from trachea of a male *Brachaspis nivalis* (Hutton) (Acrididae), collected by P. Mason. Deposited in the Department of Scientific and Industrial Research, Entomology Division, Nelson, New Zealand.

Paratypes: Larviform ♀♀, ♂♂, ♀♀. Several paratypes of each stage will be deposited in the DSIR, Entomology Division, Nelson, New Zealand. The remaining material will be at Adrian College, Adrian, Michigan. Additional paratypes were collected from the following hosts by P. Mason: May 1968, adult ♀ *Paprides nitidus* Hutton, Porter Heights; July 1968, adult ♀ *P. nitidus*, Amuri Ski Field; October 1969, adult ♂ *P. nitidus*, Porter Heights; April 1970, adult ♂ *Sigaüs australis* (Hutton), Porter Heights. All of the sites are alpine areas in Canterbury, New Zealand. Ramsay (personal communication, 1972) has found *Locustacarus masoni* associated with the following hosts: 22 Feb. 1970, Armstrong Saddle, from tube with *Sigaüs piliferus* and *Zealandosandras*; 22 Oct. 1969, Waiiau River west of Hammer in adult female *Paprides nitidis*; 29 Mar. 1970, Mt. Patriarch, in adult male and female *Brachaspis collinus* and 5 Dec. 1970, Mt. Robert, in adult female *B. collinus*.

The species is named for Paul Mason in tribute to his discovery of the species and his work on *L. masoni* in the field and the laboratory.

DISCUSSION OF *Locustacarus trachealis* AND *L. masoni*

Only 2 tracheal mites of grasshoppers are known. These are *L. trachealis* and *L. masoni*.

Locustacarus trachealis is reported from 5 species of acridid grasshoppers in Kansas and Africa. *Locusta migratoria*, a host of *L. trachealis*, occurs in Africa as well as New Zealand. Ramsay collected *L. trachealis* from an adult male *L. migratoria* in Wairoa Gorge near Nelson, New Zealand on 22–23 April, 1970. He collected *Podapolipoides grassii* from the same specimen and has additional *P. grassii* and *L. trachealis* from several *L. migratoria* collected near Nelson, New Zealand. These records are the first records of *Locustacarus trachealis* outside Africa and the United States. Repeated attempts to collect *L. trachealis* in the United States since 1915 have been unsuccessful. The biology of *L. trachealis* is discussed by Wehrle and Welch (1925) and by

Harris (1940). *Locustacarus trachealis* is associated with grasshoppers in temperate and tropical grasslands.

Locustacarus masoni occurs in trachea of 5 species of acridid grasshoppers throughout the snow-free season in alpine regions of New Zealand. The biology of *L. masoni* is discussed by Mason (in press).

The male, larviform female and adult female of *L. masoni* are approximately $\frac{3}{4}$ the size of the corresponding stages *L. trachealis*. In the male of *L. masoni*, the aedeagus is shorter, broader and more rounded apically than the aedeagus of *L. trachealis*. The spines on tibiae I, II, and III in *L. masoni* are $\frac{1}{2}$ the size of the corresponding spines in *L. trachealis*. All propodosomal setae are longer in *L. masoni* than in *L. trachealis*.

Opisthosomal plate I of the larviform female of *L. masoni* is usually broader than long, whereas in *L. trachealis* opisthosomal plate I is nearly square. Pedipalpal setae of *L. masoni* are $\frac{1}{2}$ the length of pedipalpal setae of *L. trachealis*, and the ventral gnathosomal setae in *L. masoni* are less than $\frac{1}{2}$ the width of the gnathosoma. In *L. trachealis*, ventral gnathosomal setae are longer than $\frac{1}{2}$ the width of the gnathosoma. While adult females of *L. masoni* are smaller than adult females of *L. trachealis*, the gnathosomas of *L. masoni* are larger. The eggs of *L. masoni*, in contrast to other stages, are larger than the eggs of *L. trachealis*.

The data collected by Ramsay and Mason are the most extensive yet presented for *Locustacarus*. It is quite likely that *Locustacarus* will be found throughout the world where grasshoppers are found. Additional data must be collected before hypotheses can be proposed about the relationships of species of *Locustacarus* to each other and to other Podapolipidae.

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